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Children With Persistent Feeding Difficulties: An Observational Analysis of the Feeding Interactions of Problem and Non-Problem Eaters

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This study examined the relationship between parent's feeding practices and the feeding behavior of toddlers and preschool-age children with *(n* = 19) or without *(n* = 26) persistent feeding difficulties. Specifically, patterns of parent-child interaction were assessed during standardized family mealtime observations in the clinic. Parents also kept observational records of their children's mealtime behavior at home and rated the degree of difficulty they experienced in feeding their child during each meal on a daily basis. Observational results showed that feeding-disordered children engaged in higher levels of disruptive mealtime behavior (food refusal, noncompliance, complaining, oppositional behavior, and playing with food) and lower levels of chewing during mealtime. There were several significant age effects, with younger children (under age 3) engaging in more vomiting and less aversive demanding and verbalizations. Parents of feeding-disordered children were more negative and coercive in their feeding practices and engaged in higher levels of aversive instruction giving, aversive prompting, and negative eating-related comments. There were several significant associations between coercive parental behaviors and children's food refusal and noncompliance in the sample as a whole. Measures of children's disruptiveness at mealtimes in the clinic were significantly correlated with measures of mealtime behavior in the home.

Key words: children with persistent feeding difficulties

Feeding difficulties are one of the most common behavioral disturbances in young children: An estimated 24% of 2-yearold, 19% of 3-year-old, and 18% of 4-year-old children are reported by their parents as having problems with feeding (Beautrais, Fergusson, & Shannon, 1982). Feeding problems range from transient, relatively minor behavioral problems at dinner time (e.g., messy, noisy, or disruptive mealtime behavior) to total food refusal, resulting in life-threatening malnutrition (Luiselli, 1989). Children referred for pediatric evaluation because of feeding difficulties are often reported by their parents to be reluctant eaters; problems such as resisting parental attempts to feed them, excessive slowness, highly selective eating, gagging, regurgitation, and disruptive mealtime behaviors (e.g., tantrums) are common. These behaviors can result in serious medical consequences, including malnutrition, and, invariably, parents find persistent feeding difficulties stressful.

Theories of the etiology of eating disorders increasingly reflect the complex interplay of biological, behavioral, and social factors. Organic factors hypothesized to affect children's feeding behavior and dietary intake include defects in absorption, as with cystic fibrosis, celiac disease, sugar malabsorption, and lactose intolerance; persistent vomiting from gastroesophageal reflux; vomiting and diarrhea from gastroenteritis (Bacon, Spencer, Hopwood, & Kelch, 1982); and oral-motor anatomical defects (Mathisen, Skuse, Woike, & Reilly, 1989). Psychological and behavioral factors implicated in feeding disorders include parental characteristics (maternal depression, household disorganization, and social isolation), parents' beliefs about nutrition (Pugliese, Weyman-Daum, Moses, & Lifshitz, 1987), and parent-child interaction during mealtimes (Agras, Berkowitz, Hammer, & Kraemer, 1988).

Several researchers have noted the importance of social learning factors within the family in the origin and maintenance of problem feeding behavior in young children (Finney & Christophersen, 1983; Iwata, Riordan, Wohl, & Finney, 1982). Social learning explanations of feeding difficulties point to the importance of social interactional processes surrounding eating within the family. Within this framework, a variety of potentially problematic feeding practices can contribute to either the development or maintenance of feeding problems. This may occur when parents fail to establish conditions that are conducive to eating (e.g., allowing children unrestrained access to food between meals, failure to have regular, predictable mealtimes, or serving inappropriate food in inappropriate amounts). Other problems may be related to an absence of effective cues or prompts in encouraging age-appropriate

eating (e.g., excessive use of physical or verbal prompts or instructions to eat or parents' failure to model socially appropriate mealtime behaviors), inadequate consequences for appropriate eating (e.g., failure to attend positively to children when they are eating appropriately or inconsistent or noncontingent use of rewards for eating), or weak, inconsistent, or ineffective consequences after problem feeding (e.g., providing social attention contingent on food refusal, becoming emotionally entrapped in a battle with their child over food by using guilt-inducing statements, bargaining and pleading with their child over what the child eats).

Within this general model, the social interactional conditions surrounding family mealtimes, including parental feeding practices, may affect the child's feeding behavior. However, parents management of food refusal episodes is likely to be crucial. In particular, it is hypothesized that parents become embroiled in a coercive power struggle in an attempt to make their child eat. This negative coercive cycle is hypothesized to become self-perpetuating.

Several behavioral treatment studies show that problem feeding behavior in children can be modified through techniques such as shaping, control of portion size, and use of punishment contingencies (Larson, Ayllon, & Barrett, 1987; Linscheid, Tarnowski, Rasnake, & Brams, 1987; Luiselli, 1989; Riordan, Iwata, Finney, Wohl, & Stanley, 1984; Stark, Bowen, Tyc, Evans, & Passero, 1990; Thompson, Palmer, & Linscheid, 1977). These studies provide some support for the importance of social learning influences as determinants of feeding behavior. However, because of the paucity of observational studies that used appropriate comparison groups, it is not known to what extent coercive feeding practices actually occur in families of children with feeding problems, whether coercive feeding practices differentiate between problem and nonproblem feeders, and whether such parenting practices are related to food refusal behaviors. The present study sought to fill this gap.

Because some evidence suggests that the nature and extent of feeding problems decline as a function of the age of the child (Beautrais et al., 1982), the present study examined whether differences would be evident in the feeding behavior and patterns of mother-child interaction of toddlers as compared with preschool children. We predicted that the lesser developmental capabilities of toddlers under the age of 3 years in self-feeding, and language would be reflected in parents of younger children giving more physical assistance with eating (prompts) than would parents of older children.

Other investigators argue for the importance of maternal stress and the broader social environment within which parenting takes place in explaining feeding problems in children (Altemeier, O'Connor, Sherrod & Vietze, 1985; Beautrais et al., 1982). Although "maternal deprivation"—implying a generally neglectful and uninvolved parent, incapable of catering for a child's needs—is no longer seen as adequate as an explanation for failure to thrive, it is commonly assumed that parents of children with feeding problems, particularly of those that fail to thrive, have more stressful life events to contend with, are often depressed and disorganized, and have poor marital relationships and low levels of social support, particularly from husbands. However, no studies that have investigated these variables have used adequate comparison groups. Consequently, another aim of the present research was to determine the extent to which levels of maternal depression, marital adjustment, and social support differentiated between problem and non-problem feeders.

Hence, in the present study, we used direct observational methods to obtain a detailed descriptive profile of the eating behaviors of problem and non-problem feeders. We assessed parents' feeding practices to provide a measure of the social interactional context within which children's feeding occurred. We also examined the extent to which parents' feeding practices predicted children's mealtime behaviors and the relationship between children's feeding behavior in the clinic setting and children's feeding behavior in the home. We hypothesized that (a) children with persistent feeding problems would engage in lower levels of appropriate feeding and would display higher levels of disruptive and oppositional behaviors at mealtimes compared with non-problem eaters, (b) parents of children with feeding difficulties would engage in more coercive interactive behavior designed to get their child to eat and lower levels of positive or nonaversive behavior (c) there would be a significant association between maternal feeding style and children's feeding behavior, and maternal aversiveness would be a significant predictor of feeding problems, (d) parents of problem eaters would display higher levels of depression and marital discord and lower levels of social support from friends or within the family, and (e) the specific type of feeding difficulties would vary as a function of age of the child.

Method

Subjects

Nineteen children, who presented to either the Gastroenterology Clinic in the Royal Children's Hospital or the Child Health Specialist Centre at the University of Queensland for persistent feeding difficulties, and their mothers served as subjects. A further 26 healthy, non-problem feeders were recruited as a comparison group from local preschools, kindergartens, and play groups. Children with feeding problems gained entry into the study through a two-phase assessment process. They first underwent an examination by a pediatric gastroenterologist, which included a medical history and physical examination to exclude any organic cause for the feeding problem. If the child was medically assessed as having a feeding problem that was severe enough to warrant inclusion, the child was referred to the project for further assessment. Because no widely accepted or reliable diagnostic criteria have been developed to define feeding disorders in young children, we operationally defined a child as feeding disordered if he or she met the following criteria: age between 12 months and 6 years, a history of significant and persistent feeding difficulties as determined by an intake interview, and no current organic condition that could account for the feeding problem.

Feeding problems commonly reported by parents that we considered to define feeding difficulties included persistent food refusal (e.g., turning away head when presented with food), struggling or resisting during feedings (e.g., trying to get out of high chair), refusal to self-feed (insisting that parent feed them), eating very slowly (excessive chewing of food, swilling food in the mouth, holding food in the mouth), being a very fussy eater (only consuming a narrow range of foods), consuming small amounts of food, and disruptive behavior during meals (e.g., throwing food, screaming, and temper outburst). Less frequently occurring problems included gagging and regurgitation of food. To decrease the likelihood of minor or trivial cases being included, we added the criterion that parents had requested help in managing the feeding problem.

The criteria for the comparison children were that they be between 12 months and 6 years of age and that the parent did not report major difficulties feeding the child. Occasional feeding problems (e.g., food refusal) were acceptable as long as they were not typical of the child's usual feeding behavior and the parent was not seeking any treatment for their child.

In the feeding-disordered group, approximately 71% were below the 25th percentile for weight. Of these children, 14% were at or below the 3rd percentile. The corresponding figures for non-problem eaters were 36% and 6%. We divided the feeding-disordered group into two groups for analysis: children between the age of 12 and 36 months (younger group; $n = 12$) and children between 37 and 72 months (older group; $n = 7$). Of the non-problem eaters, 11 children qualified for the younger group, and 15 children qualified for the older group.

Feeding-disordered children had a mean age of 36.9 months. The mean age for non-problem eaters was 41.4 months. Of the feeding disordered group, 43% were girls, and 57% were boys; of the non-problem eaters, 46% were girls, and 54% were boys. Approximately half of the children in each group were firstborn (50% of feeding-disordered children and 58% of non-problem eaters). The number of only children was 27% for the feeding-disordered group and 21% of the non-problem eaters. A series of univariate analyses of variance (ANOVAs) confirmed that there were no significant differences between groups on any of the demographic variables.

Observation Setting

Observations of children's feeding behavior took place in a standardized mealtime observation setting in a clinic observation room. The observation room was equipped with two wall-mounted video cameras and ceiling microphones, a child-sized table and chair, and a chair for the Child's parent. The child was observed either at a lunchtime or an evening meal, depending on whether the parent reported difficulties with the meal and the availability of the child for observation. Approximately equal numbers of lunches and evening meals occurred in each group. The experimenter introduced the assessment task by explaining to the parent that he or she should behave as if at home and if difficulties arose, he or she should deal with them in the usual manner. The conditions for observation were kept constant as much as possible. This included giving standard instructions to parents, the provision of an age-appropriate meal, the absence of toys or other distractions, and placing of the child in either a high chair or in a child-sized chair at the commencement of the meal. The mealtime interactions were recorded for 20 min. The observation period commenced when the experimenter signalled to the parent by knocking on the wall from an adjoining video control room. If the child was still eating at the end of this period, the child was allowed to

continue eating until the parent indicated that the meal was over. However, in all instances, only the first 20 min of the meal were coded for subsequent analysis.

Measures

Observations of feeding behavior. We assessed parent-child interaction during the meal by means of a Mealtime Observation Schedule (MOS; Sanders & Le Gris, 1989). The MOS provides a measure of children's problem and appropriate feeding behaviors and parents' predominant tactics for dealing with the children's mealtime behavior. It was derived from the Family Observation Schedule (Sanders, Dadds, & Bor, 1989), which has been widely used to study patterns of parent-child interaction in families of oppositional children. We modified it in the present study to include a number of specific eating behaviors of children that were derived from pilot work. These feeding categories were derived from content analyses of videotaped samples of parent-child behaviors of children referred for treatment of feeding problems. Initially, over 30 codes were identified, and operational definitions were prepared. After piloting this preliminary code to establish its reliability, low-frequency codes were either deleted or collapsed into broader response classes (e.g., preparing food). The final version of the MOS measures 17 categories of child-feeding behavior *(11* categories of disruptive mealtime behavior and 6 categories of appropriate mealtime behavior) and 14 categories of parent behavior (6 categories of aversive behavior and 8 categories of nonaversive behavior). The Appendix contains brief behavioral definitions of each observation category. Aversive parent behaviors were judged from the mother's tone of voice, facial expression, or physical contact involving contact that had the capacity to hurt the child.

The following measures were derived from the MOS: (a) percentage of intervals of overall disruptive feeding behavior and percentage of intervals of individual disruptive feeding behaviors, which were calculated by summing the number of intervals containing any disruptive behavior or each disruptive behavior, dividing by the total number of intervals, and multiplying by 100, (b) percentage of intervals of overall aversive parent behavior and percentage of intervals of individual aversive parent behaviors, (c) percentage of intervals of appropriate feeding behavior, and (d) percentage of intervals of nonaversive parent behavior. All others were calculated as was (a) above.

Observers recorded the occurrence of each category in consecutive 10-s time blocks during a 20-min videotaped observation period. Two experienced observers who had been trained in the use of the system coded all tapes, and a third observer served as a reliability checker. The kappa coefficients for each behavior category and an overall kappa across all observation categories appear in Table 1. Overall, the observation system produced a satisfactory level of interrater reliablity with a mean of .83 obtained for parent behavior (range = .71-.99) and .80 for child behavior (range = .50-.99).

Table 1
Reliability of Mealtime Observation Schedule Observation Codes

Category	K	**%** observed agreement
Parent's behavior		
Praise	.85	99
Positive contact	.91	98
Positive prompt	.80	96
Positive specific instruction	.71	98
Positive vague instruction	.65	98
Positive eating comment	.84	94
Positive social attention	.98	99
Presents food	.91	98
Removes food	.81	98
Negative contact	1.00	100
Negative prompt	1.00	100
Negative specific instruction	1.00	100
Negative vague instruction	1.00	100
Negative eating comment	1.00	100
Negative social attention	1.00	100
Overall	.83	81

Child 's behavior		
Requests food	82	99
Prepares food	88	98
Bites	91	96
Chews	92	96
Refuses food	84	99
Noncompliance	64	98
Complaint	68	99
Physical negative	1.00	100
Appropriate verbal	.84	998
Engaged activity	.77	98
Holds food	.75	99
Leaves table	.81	99
Plays with food	.50	99
Oppositional	1.00	99
Noninteraction	1.00	99
Vomits	1.00	100
Overall	.80	85

Home mealtime behavior. Parents were asked to keep a mealtime diary for a period of 2 weeks to provide a measure of children's feeding behavior at home. During each meal, parents recorded the occurrence or nonoccurrence of each of the following behavior categories: food refusal, complaining, leaving the table, spitting or vomiting, and playing with food. In addition, parents rated how difficult they thought the child had been to feed during the meal on a 7-point scale ranging from *easy* (1) to *difficult* (7). The measures derived from this system were the average difficulty rating per meal and the percentage of meals in which disruptive behaviors occurred.

Self-report measures. To determine whether feeding difficulties were associated with other difficulties within the family, parents completed three self-report inventories to provide an index of marital disharmony, depression, and social support from friends and family members. Each of these measures has been widely used in the literature and has been shown to have satisfactory reliability and validity. The Dyadic Adjustment Scale (Spanier, 1976) is a commonly used measure of parents' global marital satisfaction and has been found to discriminate between maritally distressed and nondistressed couples. The Beck Depression Inventory (BDI; Beck, Ward, Mendelson, Mock, & Erbaugh, 1961) is a 21-item self-report inventory that taps symptoms of depression in adults. This instrument is extensively used in the assessment of affective disorders, and its psychometric properties are well established. The Perceived Social Support Inventory (PSSI; Procidano & Heller, 1983) measures the extent to which parents perceive that their needs for support, information, and feedback are fulfilled by family and friends. Subscale scores have satisfactory internal consistency, with coefficient alphas of .88 for friends and .90 for families.

Procedure

After undergoing a physical examination, all children meeting selection criteria underwent a behavioral assessment—comprising an intake interview, which included a developmental history, a structured mealtime observation in the clinic observation room, and 14 days' home recording of the child's food consumption and mealtime behaviors by parents. After participation in the assessment study, all families that required further treatment participated in a feeding management program run by the Behavior Research and Therapy Centre at the University of Queensland. In the case of control children, the procedure was identical except that no physical examination was performed and treatment was not provided.

Results

Children's Feeding Behavior

To analyze the extent to which child-observational measures discriminated between feeding-disordered and non-problem eaters, we conducted two multivariate analyses of variance (MANOVAs), each a 2 x 2 (Feeding Disordered vs. Nonproblem Eater x Younger vs. Older) analysis. Table 2 contains the percentage of intervals of occurrence of disruptive and appropriate child-feeding behaviors. The MANOVAs conducted on the overall levels of child disruptive and appropriate feeding behavior showed that there was a significant main effect for group but not for age. Feeding-disordered children engaged in significantly higher levels of disruptive feeding behaviors, F(l, 40) =

19.7,*p* = .0005, and lower levels of appropriate feeding behavior, F(l, 40) = 21.0, p = .0005, than non-problem eaters.

Table 2
Mean Percentage of Intervals Containing Individual Child Behaviors

Category	Feeding-disordered children *M*	*SD*	Non-problem eaters *M*	*SD*	*p*
Disruptive behavior					
Refuses food	11.90	11.05	2.89	4.44	.001
Noncompliance	35.05	25.72	11.57	13.55	.0005
Complaint	13.74	23.12	3.54	4.95	.05
Demands	0.58	1.61	0.23	0.99	*ns*
Physical negative	0.42	1.61	0.23	0.71	*ns*
Oppositional	1.32	2.36	0.19	0.63	.01
Holds food	2.32	2.98	2.85	9.00	*ns*
Vomits	1.21	2.30	0.73	2.76	*ns*
Leaves table	7.11	14.89	11.57	16.56	*ns*
Plays with food	4.63	5.65	0.69	1.01	.003
Noninteraction	0.05	0.23	0.00	0.00	*ns*
Overall	46.39	24.25	18.16	17.36	.0005
Appropriate behavior					
Requests food	1.00	1.20	2.11	3.48	*ns*
Prepares food	14.00	13.87	15.27	16.75	*ns*
Bites food	28.79	18.89	34.50	15.21	*ns*
Chews food	43.37	23.99	60.73	20.95	.014
Appropriate verbal	6.68	8.31	9.73	9.39	*ns*
Engaged in activity	7.90	9.88	5.08	4.87	*ns*
Overall	52.94	24.53	82.15	17.21	.0005

Subsequent 2 x 2 univariate analyses showed that children with feeding disorders displayed significantly more food refusal, F(l, 44) = 13.2, *p* = .001; noncompliance, F(l, 44) = 16.65, *p* = .0005; complaining, F(l, 44) = 3.76, *p* < .05; oppositional behavior, F(l, 44) = 7.31, *p* = .01; and playing with food, F(l, 44) = 10.24, *p* = .003; and significantly lower rates of chewing, F(l, 44) = 6.51, *p* = .014, compared with non-problem eaters. Noncompliance was the most commonly occurring disruptive mealtime behavior, followed by food refusal. Chewing behavior was the only appropriate mealtime behavior that differentiated between feeding-disordered children and non-problem eaters. There were no differences in bites, requests for food, or other appropriate feeding behaviors.

Univariate ANOVAs showed that there were also several significant age effects on individual variables. Specifically, younger children tended to engage in fewer aversive demands, F(l, 44) = 5.8,*p* = .021, more vomiting, F(l, 44) = 4.49,*p* = .04, and fewer appropriate verbalizations, F(l, 44) = 4.62, *p* - .038. There were no significant Group x Age interactions.

Parents' Feeding Practices

The percentage of intervals of each category of parent behavior appear in Table 3. An identical set of analyses were conducted to examine whether parents of feeding-disordered and non-problem eaters differed in their feeding practices. The overall MANOVA revealed a significant main effect for group for aversive maternal behavior, F(l, 40) = 6.60, p = .014. There were no significant age effects or interaction effects. The results of the subsequent univariate ANOVAs showed that overall, there were numerous significant differences between

Table 3
Mean Percentage of Intervals Containing Individual Parent Behaviors

Category	Feeding-disordered children		Non-problem eaters		
	M	*SD*	*M*	*SD*	*p*
Aversive parent behavior					
Negative contact	2.15	4.13	0.04	0.20	.022
Negative prompt	2.58	5.47	0.23	0.71	.032
Negative specific instruction	4.06	8.79	0.73	1.59	.05
Negative vague instruction	2.47	3.86	0.58	1.90	.032
Negative eating comment	1.21	1.62	0.38	0.85	.041
Negative social attention	1.00	1.73	0.31	0.68	.049
Overall	10.78	16.25	1.96	3.82	.014
Nonaversive parent behavior					
Praise	3.89	4.71	3.34	5.05	*ns*
Positive contact	8.37	11.32	7.19	14.76	*ns*
Positive prompt	13.42	10.08	13.12	8.16	*ns*
Positive specific instruction	10.42	8.37	6.81	5.81	*ns*
Positive vague instruction	14.47	10.88	6.89	8.13	.009
Positive eating comment	20.31	14.02	18.58	9.84	*ns*
Positive social attention	31.06	11.65	37.39	20.94	*ns*
Presents food	16.42	14.89	9.50	16.93	*ns*
Takes food away	4.89	4.85	2.92	5.45	*ns*
Overall	82.55	22.24	79.66	19.67	*ns*

parents in aversive parent behavior but only one difference in nonaversive behavior. Parents of feeding-disordered children engaged in higher levels of negative vague instructions, F(l, 44) = *4.48*,*p* = .032; positive vague instructions, F(l, 44) = 7.5, *p* = .009; negative physical contact, *F(l,* 44) = 5.65, *p* = .022; negative prompting, F(l, 44) = *4.92*,*p* = .032; negative eating comments, F(l, 44) = 4.45, *p* = .041; and negative social attention, F(l, 44) = 4.12, *p* = .049. Of the individual nonaversive behaviors, only positive vague instructions differentiated the groups.

There were also some significant age effects: Parents of younger children engaged in significantly more positive physical contact, F(l, 44) = 7.42, *p* = .009; positive prompts, *F* (1, 44) = *4.95*, *p* = .032; food presentations, F(l, 44) = 9.43, *p* = .004; removal of food, F(l, 44) = 7.82, *p* = .008; and less positive social attention, *F(l,* 44) = *9.83*,*p* = .003. There were two significant Age x Group interactions: one for negative physical contact, F(l, 44) = *4.32*,*p* = .044, and one for positive vague instructions, F(l, 44) = 6.85, *p* = .012. Parents of younger feeding-disordered children displayed more negative contact and less nonaversive vague instructions than parents of older feeding-disordered children.

Relationship Between Different Child andParent Behaviors

We also examined the degree of association between different child and parent behaviors by means of Pearson product moment correlations of the data from the entire sample. Inspection of Table 4 shows that there were a number of significant correlations between individual parent behaviors and children's feeding behavior. Food refusal was significantly correlated with vague parental instructions (*r* = .62, *p* < .001). Noncompliance was correlated with all individual aversive parent behavior categories and also with vague nonaversive instructions (*r* = .26-.71). Playing with food was significantly associated with negative physical contact, negative instructions— both specific and vague, negative eating comments, and negative social attention. Both chewing and complaining were correlated with vague nonaversive instructions.

Table 5 shows the extent to which individual child-feeding behaviors were related to each other. Inspection of this table shows that the individual aversive child-feeding behaviors were highly intercorrelated. Five of the six individual aversive behaviors were significantly correlated with overall children's disruptive behavior (range of *r* = from .35 for playing with food to .94 for noncompliance). Of all of the individual children's behaviors, noncompliance best reflected the child's

overall level of disruptiveness *(r* = .94), and it was also significantly correlated with the feeding behaviors of food refusal, chewing, playing with food, and complaining. The intercorrelations for individual parent behaviors were also high (see Table 6): Specific negative instructions (the most frequently occurring of the individual aversive parent behaviors) were significantly correlated with negative vague instructions and other aversive parent behaviors (contact, prompts, eating comments, and social attention).

Predictors of Disruptive Feeding Behavior

We examined the relationship between parent's behaviour and child's feeding behavior in the whole sample more closely

Table 4
Correlations Between Parent's Behavior and Child's Feeding Behavior

	Parent's behavior						
	Aversive						Nonaversive
Child's behavior	Physical contact	Negative prompt	Specific instruction	Vague instruction	Eating comment	Social attention	vague instruction
Food refusal	.13	−.11	−.18	.01	.13	.04	.62***
Noncompliance	.26*	.33**	.31**	.40**	.31**	.35**	.71***
Oppositional	.17	.12	.18	.21	.10	.41***	.06
Play with food	.53***	.19	.27*	.33**	.32**	.34**	.22
Chewing	−.18	−.15	−.16	−.18	−.18	−.17	−.60***
Complaining	.16	.11	.09	.13	.18	−.05	.41**

*$p < .05$. **$p < .01$. ***$p < .001$.

Table 5
Correlations Between Children's Behaviors

Children's behavior	1	2	3	4	5	6	7
1. Food refusal	—						
2. Noncompliance	.61**	—					
3. Oppositional	−.02	.10	—				
4. Playing with food	.21	.30*	−.02	—			
5. Chewing	.50**	−.64**	.10	−.35*	—		
6. Complaining	.34*	.63**	−.10	.07	−.44**	—	
7. Overall disruptive	.64**	.94**	.12	.35*	−.68**	.67**	—

*$p < .01$. **$p < .001$.

by means of nonstepwise multiple regression, with backward removal of nonsignificant predictors. The overall level of the child's disruptive behavior was used as the criterion variable; the child's age, parent's nonaversive behavior, and parent's aversive behavior were used as the predictors. Overall, these three predictors accounted for 25% of the variance in the child's disruptive behavior. Because removal of the child's age produced no significant change in the variance accounted, only the significant predictors are presented in Table 7. Both parental aversive and parental nonaversive behavior significantly contributed to the prediction of overall children's disruptive behavior, but parental aversive behavior was more highly weighted in the equation.

To further assess the relationship between parental behavior and children's disruptiveness, we used nonstepwise backward regression analysis with each diagnostic group separately, using the same criterion and predictor variables as for the combined-groups regression analysis. For the control group, the three predictors together accounted for 63% of the variance, $F(3,22) = 12.53$, $p < .001$, $r = .79$. Because all three predictors made significant contributions to the model, none were excluded without causing a significant change in the equation. In the case of the feeding-

disordered group, none of the predictors reached significance in accounting for the variance in children's disruptive behavior.

Analysis of Food Refusal Behavior

To describe behaviors that covaried with food refusal, we identified each interval of food refusal and recorded the frequencies of other disruptive (child) or aversive (parent) or appropriate (child) or nonaversive (parent) behaviors occurring concurrently in the same interval. Figure 1 contains the four child and parent behaviors that occurred most frequently with food refusals.

For both older and younger feeding-disordered children, noncompliance was the most commonly occurring concurrent behavior. For the parents of the older feeding-disordered group, vague instructions occurred most commonly with food refusal; for younger feeding-disordered children, presentation of food occurred most commonly with food refusal.

Parental Perceptions of Children's Feeding Behavior

We analyzed data from the mealtime diary by means of a 2 (groups) x 2 (ages) ANOVA. These analyses revealed a significant main effect for both age, $F(l, 45) = 7.4$, $p = .009$, and group $F(l, 45) = 69.8$, $p = .0005$. Inspection of Table 8 shows that parents of feeding-disordered children perceived their children to be significantly more difficult to feed at home (average mealtime difficulty) than non-problem eaters, F(l, 45) = 69.82, $p = .0005$, and reported the occurrence of individual disruptive mealtime behaviors as occurring in a significantly higher percentage of daily meals, F(l, 45) = 34.23, $p = .0005$. In addition, younger children were rated as more difficult to feed than older children, F(l, 45) = 7.43,;? = .009, and displayed more aversive behavior in a higher percentage of meals, F(l, 45) = 7.17, $p = .01$. There were no significant interaction effects.

To determine the relationship between home- and clinic based measures, we also correlated the two home-based measures of feeding difficulty with observational measures of the children's disruptiveness and maternal aversive behavior in the clinic. This analysis showed that the two home measures

Table 6
Correlations Between Parents' Behaviors

Parents' behavior	1	2	3	4	5	6	7
Aversive							
1. Physical contact	—						
2. Prompt	.57**	—					
3. Specific instruction	.76**	.88**	—				
4. Vague instruction	.56**	.74**	.71**	—			
5. Eating comment	.50**	.64**	.56**	.76**	—		
6. Social attention	.52**	.45**	.63**	.60**	.30*	—	
Nonaversive							
7. Vague instruction	.06	.14	.05	.30	.35*	.14	—

*$p < .01$. **$p < .001$.

Table 7
Multiple Regression of Parenting Variables on Children's Disruptive Behavior

Criterion variable	Predictor	Standardized β	Multiple *R*	*F*	*p*
Child disruptive behavior	1. Parental aversive behavior	.56	.49	5.87	.006
	2. Parental nonaversive behavior	.29	.62		

(average mealtime difficulty ratings and the percentage of children's disruptiveness *(r* = .59, *p* = .0005) and with materdisruptive meals) were significantly correlated *(r* = .81, *p* < .0005). Average mealtime difficulty at home also was significantly correlated with the children's disruptiveness *(r* = .51, *p* = .0005) and with maternal aversiveness *(r* = .39, *p* < .005) in the clinic. Similarly the percentage of disruptive meals at home was significantly correlated with both the nal aversiveness *(r* = .41,p = .004).

Parental Adjustment Measures

There were no significant differences between the two groups on measures of marital adjustment: The mean levels for

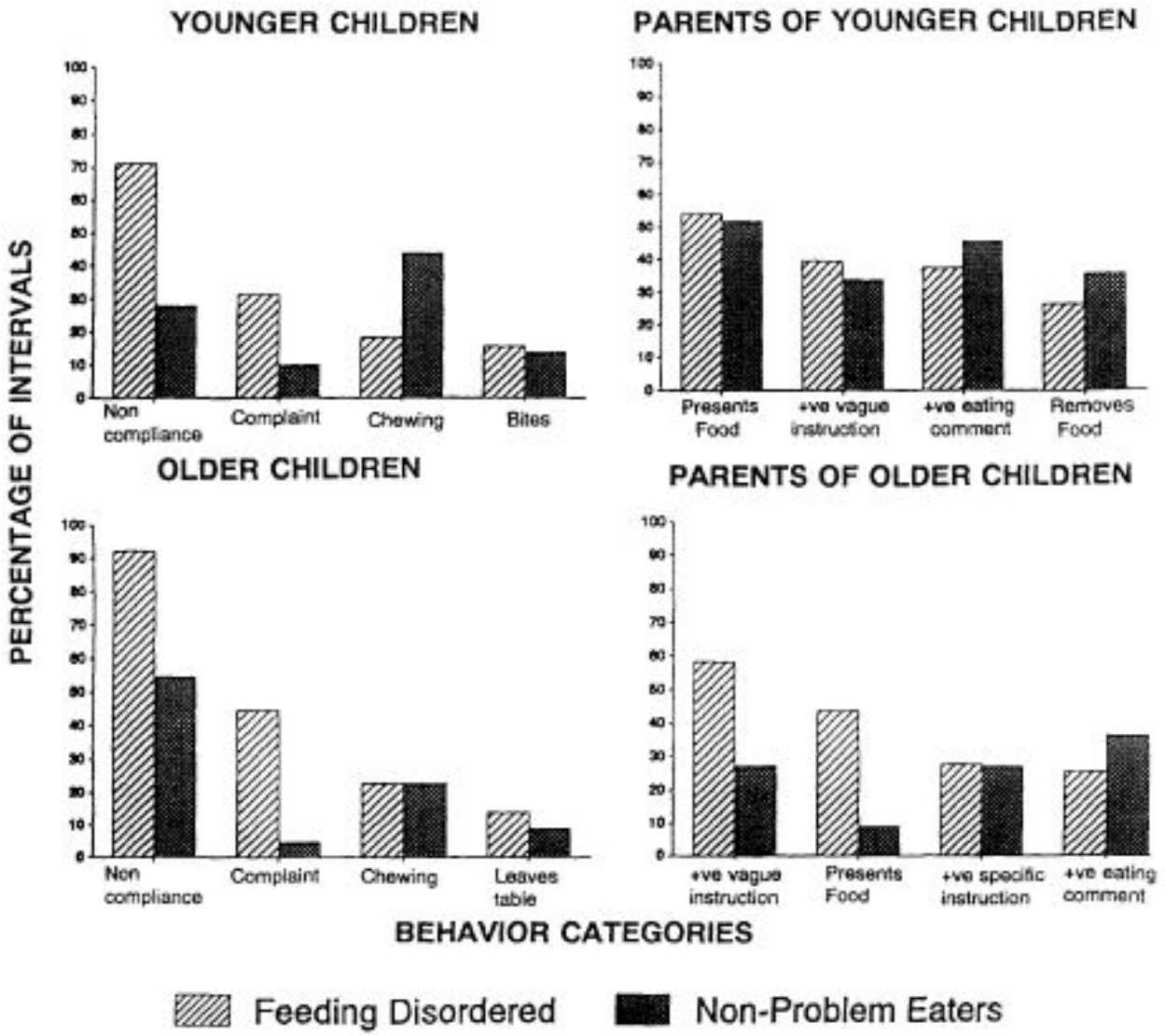

Figure 1. Percentage of intervals of food refusal in which children's and parents' individual behaviors occurred concurrently (+ve = positive).

Table 8
Self-Report Measures of Maternal Depression, Marital Adjustment, and Social Support

Measure	Feeding-disordered children		Normal eaters		
	M	*SD*	*M*	*SD*	*p*
Mealtime records					
Average difficulty rating per meal	2.70	1.04	0.70	0.59	.0001
% of meals with aversive behavior	67.90	24.93	25.60	25.27	.0001
Self-report					
Depression (BDI)	5.74	3.81	4.84	4.93	*ns*
Marital adjustment	112.50	12.45	110.00	13.13	*ns*
PSSI (friends)	14.42	3.65	14.81	4.01	*ns*
PSSI (family)	15.31	5.55	14.75	6.22	*ns*

Note. BDI = Beck Depression Inventory, PSSI = Perceived Social Support Inventory.

both groups were in the nondistressed range (see Table 8). Groups did not differ in the level of depression or social support, and there were no significant age or interaction effects.

Discussion

The present study provides clear observational evidence that feeding-disordered children display a range of disruptive feeding behaviors during mealtimes at a higher rate than non-feeding-disordered children. Of the individual disruptive behaviors, the children's level of noncompliance correlated most highly with overall mealtime disruptiveness during meals. Interval-by-interval analyses of individual episodes of food refusal showed that refusals were frequently accompanied by other noncompliant and complaining behaviors in both toddlers and preschool-age children, a pattern that was more evident for feeding-disordered children than for non-problem eaters. Clearly, feeding-disordered children protest and resist parental attempts to feed them, a struggle that probably contributes to parental perceptions of mealtimes as a stressful or difficult time of the day (Dadds, Sanders, & Bor, 1984). Although the present study did not directly assess the immediate consequences of food refusal, we can speculate that this class of behavior may function as avoidance or escape behavior that temporarily postpones food consumption through intermittent withdrawal of parental pressure to eat or by the parent's removing the food. However, in the absence of data on children's caloric intake, this assumption requires further empirical validation.

Of particular interest in the present study, both theoretically and from the point of view of treatment development, were the way in which mothers coped with their children's mealtime behavior and the relationship between mothers' feeding practices and children's feeding behavior. The present study confirms the centrality of coercive family processes in the understanding the problems of feeding-disordered children and their families (Patterson, 1982). This study provides clear evidence that parents of children with feeding problems use more coercive control tactics (presumably in an effort to counter their child's resistance during mealtimes) than parents of non-problem eaters. In particular, they gave more vague negative instructions, specific negative instructions, negative prompts, negative physical contact, negative eating comments, and negative social attention than did parents of non-problem eaters. The observational data suggested a typical sequence of maternal coaxing and pressure on the child to eat (in the form of verbal and physical prompts and instructions). We also speculate that such parental behaviors are likely to be reinforced by intermittent consumption of food by the child, which over time may lead to either increasing

coercion or acquiescence by the parents. Either of these outcomes may lead to the persistence of the child's feeding difficulties. Overall, these findings suggest that mealtimes become mutually aversive encounters for both parent and child.

The design of the present study cannot confirm the causal role of coercion variables, which requires the experimental manipulation of parental behavior or an examination of the extent to which parental feeding practices prospectively predict children's later feeding behavior and adjustment. Despite this limitation, the correlational analyses showed a moderate but statistically significant association between mothers' aversive behaviors and children's feeding behaviors. Vague instruction giving was particularly likely to be associated with increased food refusal and decreased chewing. The interactional behaviors of parents were the only psychological variables that differentiated between the groups. Furthermore, the regression analyses showed that in the group as a whole, mothers' overall level of aversive behavior was a significant predictor of disruptive feeding behavior.

From an interactional perspective, note that all the correlational relationships are bidirectional and it is likely that maternal aversiveness is also predicted by the child's level of disruptiveness (Sanders et al., 1989). Nevertheless, the causal significance of these interaction variables requires further study and, in particular, controlled treatment-outcome investigations that would attempt to manipulate parents' feeding practices. We are currently undertaking such an investigation.

We found no evidence to support the hypothesis that children's feeding problems were related to problems of marital disharmony, maternal depression, or maternal social support, because none of these self-report measures differentiated the two groups. However, note that a sample containing more children with signs of malnutrition (failure to thrive) might be expected to have parents that display greater levels of personal distress.

The present study provides support for treatment methods (particularly parent training using stimulus control and contingency management) that directly alter parents' feeding practices. The present observational results confirm that children with persistent feeding problems display a variety of other problem behaviors, particularly oppositional behavior, which complicates the parents' task of encouraging their children to eat. For some children with feeding problems, the child's oppositional behavior seemed clearly linked to the food refusal, whereas in others, the food-refusal problem was part of a more general pattern of conduct problems. There is a need for careful assessment of associated behavioral problems to determine whether treatment should focus on the child's feeding behavior alone or requires additional treatment to deal with other behavior problems.

There are several important directions for future research in this area. First, children with feeding problems in this study were a heterogeneous group of children with persistent feeding problems with mixed medical and developmental histories (e.g., failure to thrive, a prior history of gastroesphageal reflux), although none had any current organic problem that could account for the feeding problem. It would be useful to obtain observational data on more homogeneously defined clinical samples who meet explicit diagnostic criteria. Unfortunately, useful empirically validated diagnostic classificatory systems for the assessment of feeding problems in young children have yet to be developed, therefore precluding the establishment of the reliability of our diagnosis. Nevertheless, we used rigorous screening procedures and operational criteria to ensure the inclusion of only nontrivial cases. Second, an additional test of the role of social learning variables in explaining feeding difficulties would involve a detailed assessment of the antecedent and consequences of specific episodes of food refusal to determine the social contingencies (antecedent and consequent conditions) associated with children's feeding behaviors. Third, it would be useful to monitor children longitudinally to determine whether any of the interactional behaviors predict persistence of feeding problems or malnutrition. Such information would be useful in determining potential targets for intervention. Fourth, it would be useful to determine whether contextual variables other than parental feeding practices—including menus and the behavior of fathers, nonreferred siblings, peers, or grandparents— influence children's feeding. Finally, because some problem feeders are clinically malnourished, a more detailed analysis of children's nutritional status is warranted. Toward this end, anthropometric indexes and measures of nutrient intake are needed.

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Appendix
Brief Definitions of Behavior Categories in the Mealtime Observation Schedule

Disruptive Child Feeding Behaviors

1. Noncompliance (NC): Refusal to initiate compliance with parental instructions (specific or vague) within 5s. Excludes instances of noncompliance that meet the criteria for food refusal.
2. Complaint (CP): Any instance of verbal complaint involving whining, screaming, vocal protests, or displays of temper.. Excludes aversive demands.
3. Demands (M-): Any instance of instruction delivered to another person by the child that is judged to be aversive or unpleasant (e.g., "Fix my dinner NOW!").
4. Physical negative (PN): Any actual or threatened physical attack or damage to another person or destruction of an object (e.g., punching, kicking, biting, scratching, and pinching).
5. Oppositional (O): Other inappropriate behaviors (e.g., teasing or breaking family rules) that cannot be classified under other categories.
6. Noninteraction (M): Category used to describe absence of interaction with people, food, or objects (e.g., parent and child sit at table, saying nothing or doing nothing).
7. Refuses food (RF): Shakes head, turns head away, pushes food away, says no or comment with similar meaning, or pulls head away from bottle.. Scored separately from instances of non-compliance with parental instructions.
8. Holds food (HF): Holds food in hand without biting or chewing.

9. Spits/vomits (V): Any instance in which food that has been in the mouth comes out again.
10. Leaves table (L): Any instance in which the child gets up from the chair during the meal. She or he may also walk around the table or around the room.
11. Plays with food (PL): Any use of food, utensil, or container in a manner unrelated to eating or drinking.

Appropriate Child Feeding Behaviors

1. Requests food (R): Any request or demand for food.. May be verbal or use some form of sign (e.g., pointing to sausage).
2. Prepares food (PF): Any behavior that prepares food for eating (e.g., opening containers, cutting or scooping with utensils, moving food from packaging to position for eating). Excludes drinks for children over 1 year of age.
3. Bites (B): Child bites food, sucks a nipple or teat, or places food in mouth.
4. Chews (CH): Moves food around in the mouth or grinds food between teeth.
5. Appropriate verbal (AV): Acceptable behavior lasting an entire interval, containing any intelligible verbalization by the child, that cannot be scored under other categories.
6. Engaged in activity (AE): Acceptable behavior or activity lasting an entire interval that does not contain intelligible verbalization and that cannot be scored under other categories.

Aversive Parent Behaviors

1. Aversive contact (C-): Any contact causing or having the potential to cause pain or discomfort in the child.
2. Aversive prompt (PR-): Any instruction delivered aversively by the parent that is obeyed by the child.
3. Aversive specific instruction (AI-): Any verbal command that is clear and has a specific behavioral referent but is presented aversively.
4. Aversive vague instruction (VI-): Any verbal command that is unclear, lacks a specific behavioral referent, and is presented aversively.
5. Aversive eating comment (EC-): Any general comment or question related to the current meal that is presented aversively and cannot be coded as PR—, AI—, or BI—.
6. Aversive social attention (S—): Any attention, verbal or nonverbal, that cannot be scored under other categories and that is deemed to be aversive because of content or tone of voice.

Nonaversive Parent Behaviors

1. Praise (P): Any nonaversive praise offered to the child by the parent.It may be descriptive or global.
2. Contact (C): Any contact deemed to be nonaversive, that is, not causing or having the potential to cause physical harm.
3. Prompt (PR): Any nonaversive instruction given by the parent that is obeyed by the child.
4. Specific instruction (AI): Any verbal command that is clear, that has a specific behavioral referent, and that is presented onaversively.
5. Vague instruction (VI): Any verbal command that is unclear, lacks a specific behavioral referent, and is presented calmly.
6. Eating comment (EC): Any general comment or question related to the current meal that is presented nonaversively and that cannot be coded as P, PR, AI, or BI.
7. Social attention (S): Any nonaversive attention, verbal or nonverbal, that cannot be scored under other categories. Includes glancing. Parent initiated or in response to child.
8. Presents food (F): Places food near the child. In the case of a baby, puts the bottle in or near the child's mouth. Excludes drinks for children over 1 year.
9. Removes food (F-): Takes food away from the child or from near the child.